Stress Takotsubo cardiomyopathy after pylorus preserving pancreaticoduodenectomy for cancer. A case report

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Abstract: A pylorus-preserving cephalic pancreaticoduodenectomy was performed for tumor removal in a male elderly patient. In the following course no surgical complications occurred but ST-elevations and increase of Troponin T were observed. A coronary angiography revealed no relevant stenosis although a severe hypokinesis of the apex region was determined by echocardiography – a Takotsubo syndrome was assumed. This led to a significant prolonged clinical course. No residual problems remained but the cause of Takotsubo could not be identified. Analyzing the current knowledge, a feasible preoperative screening for this severe condition seems to be quite impossible.

Key words: Takotsubo ; morbidity ; surgery ; pancreas ; cancer.

Report of case

A tumor of the head of the pancreas was diagnosed in a 69-year-old male patient (BMI 23). Hypothyroidism had been treated with Levothyrox 125 mg (microgram) once daily. The past medical history was insignificant for functional cardiac limitation or chest pain. The preoperative blood pressure was 130/80 mmHg and heart rate, heart murmurs, and lungs were regular. Electrocardiogram (ECG) and chest X-ray revealed no pathological findings.

A pylorus-preserving cephalic pancreaticoduodenectomy was then performed. The patient received preoperative epidural analgesia (EA). Cefuroxim 1.5 g and Metronidazol 0.5 g were given twice intraoperatively, whereas 250 mg of statin was administered continuously per hour. Surgery was uneventful, lasted 255 minutes, and was performed under general anesthesia (propofol, cis-atracurium, and remifentanil). Six ml/h of a ropivacaine 0.2% and sufentanil 0.5 mg/ml combination were administered epidurally. A short episode of bradycardia (40 beats per minute, bpm) was treated with 0.5 mg atropine intravenously. The histopathological results revealed a pancreatic adenocarcinoma (pT3, pN0, R0, N0, M0).

Postoperatively, the patient was monitored in the Intensive Care Unit (ICU). Two hours after surgery, norepinephrine was needed (0.07 µg/kg/min continuously) due to a reduced systolic blood pressure (< 90 mmHg) in spite of an adequate volume substitution. Eight hours after surgery, the ECG showed ST-elevations in leads II, III, aVF and V1-V4. A myocardial infarction was suspected. The immediate blood results showed a slight increased troponin T (0.08 mg/l ; normal value < 0.03 mg/l), which elevated to 0.53 mg/l only 12 hours after surgery. An emergency coronary angiography was performed, which revealed no relevant stenosis of the coronary arteries. An almost general akinesis of the entire walls, especially in the apex region, was evidenced by the echocardiography. The ventricular function was relevantly reduced (ejection fraction of 24%).

This typical infrequent left-ventricular-dysfunction syndrome – called Takotsubo – observed here in a male patient has already been described (1). Our patient was successfully treated with beta-adrenergic blockade and continuous administration of heparin. Intermittent cardiac arrhythmias, a systemic inflammatory response syndrome, and a bleeding gastric ulcer prolonged further the clinical course. Repeated echocardiography showed an improving cardiac function and better motility. However, 12 days were necessary for Troponin T to return within the normal range. A clinically and hemodynamically stable patient was
dismissed from the ICU 23 days after surgery with normal ECG.

**DISCUSSION**

Takotsubo is a syndrome (TTS) characterized by ischemic changes on the ECG, but normal coronary arteries. The ventriculogram shows an apical ballooning deficit with a basal hyperkinesis. Clinical signs are chest pain or dyspnea, a release of cardiac enzymes and a significant left ventricular dysfunction. Surgical stress and general anesthesia might be potent promoters, but one quarter occurs without a trigger. The administration of catecholamines increases the risk for the development of a TTS. Emotional stress is frequently found preceding this syndrome.

So far, the underlying mechanism establishing the link between sympathetic stimulation and myocardial stunning is obscure. One possibility seems to be a coronary artery spasm. But-multivessel epicardial spasm resulting in a fulminant hypokinesis seems unlikely in patients without a coronary artery disease. Alternative mechanisms like microvascular spasm or direct myocyte injury have been advocated. Due to the fact that the apical myocardium has enhanced responsiveness to sympathetic stimulation, it might be possible that the apex is more vulnerable to sudden surges caused by sympathetic interferences. Stress-endogenic catecholamines may play an important role in triggering a direct temporary myocyte injury. In our patient, although the sympathetic stimulation was reduced by EA, is it possible that microvascular spasm or direct myocyte injury were not prevented by the dosis or volume used (6 ml/h). It is known that T-wave changes in ECG occasionally occur postoperatively. Recently, an increasing number of reports has described Takotsubo cardiomyopathy after general anesthesia for non-cardiac surgery. This may reflect an increasing awareness of this syndrome, rather than an increasing prevalence. Nevertheless, the incidence of stress cardiomyopathy is unknown—but probably higher than expected.

In Japan, TTS is more frequent. It is unclear whether better diagnostics or enhanced screening explain this fact. To the author’s knowledge, monitoring and the German medical health care system are similar to Japan. The prevalence of vessel spasm is not different between the populations. Most presumably, the mechanisms leading to temporary direct myocardial injury are cyclic AMP-mediated calcium imbalance, free radicals or contraction band necrosis due to elevated catecholamines. Further research is necessary to determine the association between massive catecholamine release and sympathetic activation leading to a stress cardiomyopathy.

Almost all studies on TTS are small and observational. This disease is potentially life threatening. A completely reversible rare syndrome after severe emotional stress or extended surgery has also been described.

The trigger for this syndrome remains uncertain. Analyzing the various reports of Takotsubo after general anesthesia, there are no apparent similarities in past medical history, performed procedures or used drugs. Even if the patients underwent specific preoperative cardiac examination, no hint for heart abnormalities was evidenced. Considering the low prevalence of this condition, it will be very difficult to find a feasible way of preoperative screening.

**References**